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29177 7590 06/27/2008 BELF., BOYD & LLOYD, LLP P.O. BOX 1135 CHICAGO, IL 60690				
EXAMINER				
YEH, EUENG NAN				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/502,423

Applicant(s)

BASE ET AL.

Examiner

EUENG-NAN YEH

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Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2008.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-23 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 14-23 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on March 10, 2008 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-8508)
4) ☐ Interview Summary (PTO-413)
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____
Paper No(s)/Mail Date _____

FINAL ACTION

Response to Amendments

1. The following Office Action is responsive to the amendment and remarks received on March 10, 2008. Original claims 14-23 remain pending.

Drawings

2. The amended drawings are objected to because of following minor informalities:
The drawings in the replacement sheet are objected to as failing to comply with 37 CFR 1.84(p)(5) because the labels "Figure 1" and "Figure 2" are missing.
3. The drawings are objected to under 37 CFR 1.83(a). The drawings **must show every feature of the invention specified in the claims**. For example, claim 14 recites four steps and none of them is shown in any figure. Therefore, the claimed subject matter: all the features included in **"method for coding a sequence of digitized images with a plurality of macro blocks in error-prone networks environment"** must be shown or the features canceled from the claims. No new matter should be entered.
4. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate

prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. **The objection to the drawings will not be held in abeyance.**

Specification

5. The disclosure is objected to because of the following informalities and appropriate corrections are required:

- a) Page 3, line 17 "vol. 3, 16.09.1996, pp.763-766 (Lio et al)". The author name was spelled wrong. The correct name is **Liao** et al.
- b) Page 8, equation (1): clarify the difference between function v of $v(m, r)$ on the left hand side of equation (1) and variable v of (m, r, v) on the right hand side of equation (1).

- c) Page 8, clarify the difference between non bold face arguments (m, r, v) used in equation (1) and bold face arguments (**m, r, v**) used in line 14.
- d) Page 8, line 16 wherein the statement of Lagrange cost function contains mix of non bold face and bold face arguments. Please clarify the difference.
- e) Page 9, clarify the difference between non bold face variables $v(m, r)$ and f used in equation 2 and bold face **$v(m, r)$** and **f** used at line 7. Note in equation (1) non bold face $v(m, r)$ used.

Claim Objections - 37 CFR 1.75(a)

6. The following is a quotation of 37 CFR 1.75(a):

The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

Claims 14-23 are objected to under 37 CFR 1.75(a), as failing to particularly point out and distinctly claim the subject matter which application regards as his invention or discovery:

a) There are insufficient antecedent basis for the following limitation(s):

Claim 14 recites the limitation "the image" in line 5 and "the selection" in line 11.

b) It is not clear how the plurality of blocks of the "images" can be accessed from a single section of the "image" in claim 14, line 5. *How can multiple images be derived from a single image?*

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of J. Kim et al. (US 2003/0031128 A1; hereinafter referred to as Kim03) and H. Kim et al. (US 2002/0126757 A1; hereinafter referred to as Kim02).

Regarding claim 14, Kim03 discloses a coding system comprising:
coding the macro blocks to determine accessible reference images ("An enhanced Adaptive Intra Refresh (AIR) process provides efficient error resiliency by selectively

and adaptively encoding macroblocks in a predicted frame" in paragraph 16, line 1. See also "error resiliency technique adopted by MPEG-4 is data partitioning, used to separate motion information from texture information using a second resynchronization marker inserted between motion and texture information. Thus, if there is an error and the texture information is undecodable or lost, the decoder can utilize the motion information to conceal the error by using the motion information to compensate the previous decoded frame or VOP" in paragraph 12, line 6. Furthermore, "To adequately improve the coding efficiency, the number of I-frames should be reduced or minimized ... Thus, it is advantageous to correctly and accurately detect scene changes" in paragraph 47, line 7. See also "scene change frames are generally intracoded. To locate the scene change frames, the preprocessing module's scene change analysis performs a color-weighted Root Mean Squared (RMS) calculation and a Mean Absolute Differences (MAD) calculation ..." in paragraph 50, line 1);

coding a section of the macro blocks of the images in a section of the image in a first intra-coding mode depending on predetermined criteria ("Many standard MPEG-4 encoders can only handle one scene, that is, one I-frame followed by P-frames or B-frames, or they introduce regular I-frames every k frames, as is commonly done in MPEG-2 encoding ..." in paragraph 47, line 1. The predetermined criteria can be the error resiliency error robustness condition: "An enhanced Adaptive Intra Refresh (AIR) process provides efficient error resiliency by selectively and adaptively encoding macroblocks in a predicted frame" in paragraph 16, line 1, and "MPEG-4 provides for

object scalability, improved error robustness and enhanced compression" in paragraph 9, line 6);

coding another section of the macro blocks of the image in a second intra-coding mode, wherein the number of accessible reference images selects a specified number of macro blocks ("... In one embodiment, an adaptive motion area process is performed to determine which macroblocks are to be intracoded. Adaptive motion change detection can efficiently reduce the large propagation error, including errors occurring in the motion area ..." in paragraph 16, line 3. More discussions for the intracoding: "One embodiment of the present invention is a method of performing adaptive intra refresh, the method comprising ..." in paragraph 17, line 1, and "[a]nother embodiment of the present invention is a method of selectively intracoding macroblocks ..." in paragraph 18, line 1);

limiting the selection from the number of accessible reference images in such a way that referencing takes place from image areas that were not subjected to the first intra-coding mode at a later stage ("... [a]n intercode distortion value and an intracode distortion value are calculated, as are an intercode bit quantity and an intracode quantity. Based on a comparison of the calculated intercode distortion value and the intracode distortion value, and on a comparison of the intercode bit quantity and the intracode bit quantity for each macroblock, a decision is made as to which predicted frame macroblocks are to be intracoded" in paragraph 16, line 8. As discussed before that I-frames are preferably used in scene-changes only and the scene change analysis is based on RMS calculation and MAD calculation discussed in paragraphs 50-54. "in

one example a frame is designated as a scene change, and thus will be coded in INTRA mode, when its MAD is greater than 20 and the second derivative of RMS is negative and has an absolute value of greater than 4. In another example, a frame is designated as a scene change, and thus will be coded in INTRA mode, when its RMS is greater than 40 ..." in paragraph 59, line 1).

Kim03 does not explicitly disclose a coding system to perform the intra/inter block selection.

Kim02, in the same field of endeavor of video encoding ("intra updating technique based on error probabilities estimated from a size of bit stream for each block" in paragraph 1, line 3), discussed in figure 2, numerals 209 and 210 for inter/intra coding process: "[w]hen carrying out an encoding as a measure for the case where errors occur during the transmission, and where thus the normal decoding becomes impossible, the relevant blocks are not subjected to the inter coded frame encoding method, but to the intra coded frame encoding method" in Kim02 paragraph 20, line 5.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to provide the coding system Kim03 made with intra/inter block coding selection as taught by Kim02, "thus, the degradation of the picture quality due to the error propagation can be overcome ..." in Kim02 paragraph 39, line 10.

Regarding claim 15, the predetermined criteria for carrying out the coding in a first intra-coding mode are error robustness criteria with respect to an incorrect transmission of coded images (discussed in claim 14, "MPEG-4 provides for object

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scalability, improved error robustness and enhanced compression" in Kim03 paragraph 9, line 6).

Regarding claims 16 and 17 (the first intra-coding mode under error robustness condition was carried out by MGPE-4: "MPEG-4 has enhanced error resiliency as compared to previous versions of MPEG so that video data can be more successfully transmitted over such error prone networks ..." in Kim03 paragraph 11, line 1. This can be carried out at regular time intervals: "standard MPEG-4 encoders can only handle one scene, that is, one I-frame followed by P-frames or B-frames, or they introduce regular I-frames every k frames ..." in Kim03 paragraph 47, line 1. Or, at random time intervals: "To adequately improve the coding efficiency, the number of I-frames should be reduced or minimized. In the absence of error conditions, I-frames are preferably used in scene-changes only ..." in Kim03 paragraph 47, line 7).

9. Claims 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kim03 and Kim02 as described above, and further in view of Yokoyama et al. (US 6,078,618).

Regarding claim 18, the combination of Kim03 and Kim02 teaches a coding system comprising:
determining a rate distortion movement compensation value for each of the vectors ("... [b]ased on a comparison of the calculated intercode distortion value and the intracode distortion value, and on a comparison of the intercode bit quantity and the intracode bit

quantity for each macroblock, a decision is made as to which predicted frame macroblocks are to be intracoded" in Kim03 paragraph 16, line 10. Without departing from the scope and spirit of Kim03's methodology, the amount of distortion value and bit quantity is the rate distortion movement compensation value); selecting the detected movement vectors in accordance with a determined rate distortion movement compensation value (as discussed above, the rate distortion movement compensation value will be used to determine macroblocks which defines the movement vectors).

The Kim03 and Kim02 combination does not explicitly disclose the moving vector optimization.

Yokoyama, in the same field of endeavor of video encoding ("relates to a motion vector estimation system which is used for encoding a moving picture" at column 1, line 4), illustrates the motion vector estimation system in figure 1, numeral 103: "the invention is to provide the motion vector estimation system and method capable of estimating the optimum motion vector even in the case where a limited search window is used" at column 3, line 5.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to provide the coding system of Kim03 and Kim02 combination, to include moving vector optimization as taught by Yokoyama, "...to improve the picture quality measured by the S-N ratio ... to estimate the optimum motion vector, thereby obtaining an improved effect of the picture quality ..." at column 10, line 32.

Regarding claim 19, the step of limiting the selection from the number of accessible reference images further comprises the step of creating a limited number of inter-coding mode combinations and reference images, wherein combinations that were coded in a later image in a first intra-coding mode are removed (as depicted in Kim02 figure 2, numerals 206 and 213 to create a limited number of inter-coding and reference image).

Regarding claim 20, the step of limiting the selection from the number of accessible reference images further comprises the step of forming a best combination based on the rate distortion (discussed in claim 18 the moving vector is optimized, thus, the distortion rate optimally comprises the best combination. Furthermore, "A certain number of bits are needed for the Inter mode encoding and the Intra mode encoding ... can be used to select the best coding mode" in Kim03 paragraph 228, line 1. See also Kim02 figure 2, numeral 212 the threshold control for the frame and bit determination).

Regarding claim 21, the rate distortion is determined by processing an error rate to be expected when the coded images are transmitted ("If the encoder has sufficient resources and capability, a full Rate-Distortion optimization can be performed that involves determination of an optimal weighting factor λ to be used for evaluating a cost function for each macroblock, given by:

$$C = D + \lambda R$$

Equation 24"

in Kim03 paragraph 229, line 1. Wherein D is the rate and R is the distortion).

Regarding claim 22, the distortion of the pixel values contains the total of the quadratic differences between the pixel values before coding and the correspondingly decoded pixel values ("in one embodiment the encoder system 100 includes corresponding decoder circuitry so that it can mimic the decoder process and reconstruct what the decoder will reconstruct both in the absence of errors, and in the presence of one or more errors, such as a single error affecting just the current macroblock ("MBC"). By way of example, the difference between the error-free reconstruction and the reconstruction assuming one error is termed "concealment error" or EC. EC is defined as follows:

$$EC = MBQ - MBC$$

Equation 16

Where MBQ is the error free reconstruction, and MBC is a single error reconstruction" in Kim03 paragraph 198, line 2. Furthermore, variance, i.e. quadratic difference, is being introduced in Kim03 paragraphs 208 and 209).

Regarding claim 23, the distortion is estimated to determine the rate distortion criteria (discussed in claim 21 Equation 21, the distortion D is estimated to determine the cost function C, i.e. the rate distortion).

Response to Arguments

a) Summary of Applicant's Remark:

The previous drawing, specification and claim objections should be withdrawn in view of the amendment.

Examiner's Response:

The amendments overcome the objections to drawings and specification set forth in the previous office action except those discussed above again.

b) Summary of Applicant's Remarks:

"MPEG4 does not support multiple reference frames" at response page 29, line 22.

Examiner's Response:

As stated in Kim (US 2003/0031128 A1) paragraph 45, line 11 "...while embodiments of the invention are described in the context of MPEG-4, aspects of the principles and advantages described herein are also applicable to other video standards, including, by way of example, MPEG-1, MPEG-2, H.261, H.262, H.263, H.263+, H.263++, and H.26L ...". It is also known in the art that a specified negotiable coding option called "Reference Picture Selection Mode" (RPS mode) permits a modified inter-picture prediction called "NEWPRED". The RPS mode is designed to suppress the temporal error propagation due to the inter-frame coding which occurs in case of transmission errors. Techniques that use multiple reference pictures in order to achieve the additional goal of improving coding efficiency are being analyzed within the MPEG-4 standardization group. These techniques include schemes known as "Sprites,"

"Global Motion Compensation," "Short-Term Frame Memory/Long-Term Frame Memory" and "Background Memory" prediction.

c) Summary of Applicant's Remarks:

"Kim03 fails to disclose a determination of accessible reference images, since the video encoder always uses on particular previously decoded frame for inter-prediction" at response page 29, line 26.

Examiner's Response:

As discussed in claim 14, Kim03 applies the RMS calculation and MAD calculation to determine reference frames. Refer to the rejections above.

d) Summary of Applicant's Remarks:

"Kim03 fails to disclose the use of two intra-coding modes and performing coding dependent upon two intra-coding modes for images at a later stage" at response page 30, line 9.

Examiner's Response:

As discussed in claim 14: "One embodiment of the present invention is a method of performing adaptive intra refresh, the method comprising ..." in Kim03 paragraph 17, line 1, and "[a]nother embodiment of the present invention is a method of selectively intracoding macroblocks ..." in paragraph 18, line 1. Refer to the rejections above.

e) Summary of Applicant's Remarks:

"This procedure only determines the coding mode, but not limiting the selection from the number of accessible reference images, as required by the claimed invention" at response page 30, line 19.

Examiner's Response:

As discussed by Kim03 the selection of reference images is limited: "in one example a frame is designated as a scene change, and thus will be coded in INTRA mode, when its MAD is greater than 20 and the second derivative of RMS is negative and has an absolute value of greater than 4. In another example, a frame is designated as a scene change, and thus will be coded in INTRA mode, when its RMS is greater than 40 ..." in paragraph 59, line 1. Refer to the rejections above.

Conclusion

10. Applicant's amendment is rejected in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eueng-nan Yeh whose telephone number is 571-270-1586. The examiner can normally be reached on Monday-Friday 8AM-4:30PM EDT.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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